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(54) A device for impressing raised patterns on sheet materials.

(57) A device is provided for impressing sheet materials with raised patterns which comprises an embossing roller (2) and an auxiliary roller (3) set adjacently and rotatable about respective parallel axes (2a,3a) of rotation, said embossing roller (2) comprising a plurality of consecutive assembly elements (8) aligned to one another along a longitudinal direction lying parallel to said axes (2a,3a) of rotation and defining outwardly annular bands of a cylindrical surface (4) having surface corrugations adapted to produce a raised impression of said sheet materials (5), said embossing roller (2) further comprising means (9,10) for releasably engaging said assembly elements (8) which are adapted to enable each said assembly elements (8) to be set at a selected position along said longitudinal direction.

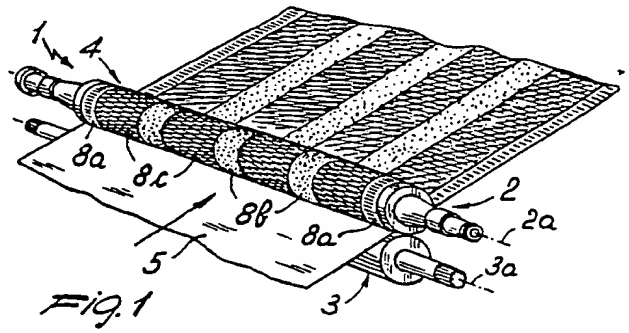

Fig. 1

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DEVICE FOR IMPRESSING RAISED PATTERNS ON SHEET MATERIALS

This invention has for its subject-matter a device for impressing raised patterns on sheet materials.

As is known, various materials, such as paper and plastics, which may be in sheet form, or cut sheet or web forms, are in many cases subjected to a surface deformation process whereby raised patterns or designs are impressed thereon.

This raised pattern impressing technique is also referred to as embossing and is carried out on special calenders, called embossing calenders, which include inter alia embossing rollers carrying the raised patterns or designs to be impressed.

Embossing is of fundamental importance for the plastics industries involved in the manufacture of coverings and imitation hide, where the plastics are to acquire the surface appearance of leather or some specific hides or fabrics or other materials of various kinds.

Where the plastics produced are intended for use in fashion articles, clothings, or accessories for articles of clothing, considerable variety and originality is required of the ornamental patterns in addition to quality embossing.

Furthermore, fashionable articles are liable to change within a very short time, thereby patterns and designs must be also changed, often within months.

The above demands can only be met with difficulty by the industries which supply plastics imitations of a variety of materials. And this even though the embossing technique has long reached a high quality level and an outstanding ability to imitate a wide range of materials.

It should be considered, in fact, that each sheet or web impressed with a new pattern or a new combination of patterns or designs requires, using conventional embossing techniques, the provision of a special embossing roller.

Each embossing roller is usually made of chromium-plated steel and has a length of about two meters, and requires high-precision engraving, which is cost-intensive and time consuming.

This long manufacturing time delays production to a large extent versus the demands of fashions, and further shortens the time period over which a given pattern may be utilized.

It should be also considered that in the field of fashionable articles, it is not only the designs that change but also, in many cases, the apparent combinations of materials, and in many cases a clothing element or accessory has indeed a compsite appearance in which various materials, such as fabrics, hides, fibers, appear to alternate and combine together.

This situation is objectionable in the extreme because it slows down the penetration of products and articles which, while being in many cases perfectly finished and aesthetically highly valuable, carry a low price and reduce the use of rare materials and hides, possibly from animals threatened with extinction.

In addition, this situation restricts the stylist's choice, who could otherwise make liberal use of much varied and unique aesthetic effects.

In an attempt at solving the cited problems at least in part, technical solutions have already been developed as shown in French Patent No. 2,107,707 and German Patent No. 2,337,599.

French Patent No. 2,107,707 shows a fully grooved roller structure from which shaped elements stand proud which are attached to the grooves. These shaped elements are removable and effective to produce the patterns for embossing.

German Patent No. 2,337,599 shows a number of spaced rollers successively active on one and the same sheet material. Each roller is engraved with part of the end pattern, and the final effect can be altered by just using some of the rollers or changing some rollers.

Note should be taken of that the roller of said French patent can only be used for a specific and limited type of patterns: those carrying a motifs of limited spread, well apart from one another, it being impossible to emboss over the entire surface. For instance, the typical embossing for imitation hides is not feasible.

The device according to the cited German patent requires instead a complex and accurate embossing procedure for the pattern lapping. In addition, all the rollers must be interrelated at all times, because they are to present decorations which can overlap one another at all times.

Thus, the technical problem remains unsolved of how to provide, in a simple and economical manner, for an embossing which be satisfactory both from the standpoint of quality, variety, and combination of patterns and effects, and of the ability to promptly accommodate the changeable demands of fashion.

The technical task that underlies this invention is to provide a device which can substantially solve said technical problem.

The technical task is substantially solved by a device for impressing raised patterns on sheet materials which comprises an embossing roller and an auxiliary roller lying adjacent for rotation about respective parallel rotation axes, said embossing roller presenting a cylindrical surface having surface

corrugations adapted to impress raised patterns on said sheet materials, and is characterized in that said embossing roller comprises a plurality of consecutive assembly elements defining outwardly annular bands of said cylindrical surface formed with said surface corrugations and being aligned to one another along a longitudinal direction parallel to said axes of rotation, and that said embossing roller comprises means for releasably engaging said assembly elements effective to enable location of each said assembly elements at a selected location along said longitudinal direction.

Further features and the advantages of the invention will be apparent from the following detailed description of a preferred embodiment of a device according to the invention, as shown in the accompanying drawings, where:

Figure 1 shows schematically in perspective the inventive device in an operating condition thereof;

Figure 2 shows a portion of a sheet material as embossed according to Figure 1;

Figure 3 shows schematically how the combination of patterns of Figure 2 may be used;

Figure 4 shows a portion of the inventive embossing roller partly cut away;

Figure 5 is a partly sectional and partly exploded view of the overall structure of the embossing roller;

Figure 6 is a left side view of the embossing roller as shown in Figure 5, in the assembled state thereof;

Figure 7 is a section VII-VII of Figure 5; and

Figure 8 is an overall elevation view of the device according to the invention.

With reference to the cited figures, the device of this invention is generally denoted by the numeral 1. It comprises an embossing roller 2, which may be made of chrome-plated steel, and an auxiliary roller 3, which may be made of a smooth elastic rubber, being arranged side-by-side and rotatably about respective axes 2a, 3a of rotation.

The embossing roller 2 has on the whole a cylindrical surface 4 carrying raised surface corrugations adapted to cause continuous raised stripes 5 extending between the rollers 3 and 4 to be embossed.

The stripes 5 may be any material, although paper would be embossed which, as suitably coated, will cooperate in defining the surface features of plastics imitating naturally occurring materials.

A first feature of the invention is that the embossing roller 2 is divided into plural assembly elements 8 arranged consecutively and aligned to one another along a longitudinal direction parallel to the axes 2a and 3a of rotation.

The assembly elements 8 each define outwardly an annular band of the cylindrical surface 4 which has respective surface corrugations for embossing purposes.

In addition, means 9, 10 of releasable engagement are provided for the assembly elements 8 which allow them to be each arranged removably at a selected position along said longitudinal direction.

In detail, the embossing roller 2 is provided with a supporting core 6 and a shroud 7 is provided on said core which itself defines the cylindrical surface 4. The assembly elements 8 are defined by annular portions of the shroud 7 which are engaged removably on the core 6 and can be assembled together at mutually aligned positions.

In the example shown, the shroud 7 is defined by nine assembly elements or aligned annular portions 8 which are selected and positioned to impart on the ornamental patterns of the cylindrical surface 4, shown only schematically, symmetrical features about a transverse mid-plane to the embossing roller.

Throughout the several embossing rollers which may be made, the number of positions of the assembly elements or annular portions 8 may be selected as desired, and particularly the structure of the shroud may even be quite asymmetrical.

The annular portions 8 differ from one another not only by their positions and specific markings but also by their longitudinal dimensions, in a parallel direction to said longitudinal direction of the embossing roller 2.

For instance, in the illustrated case, first thin marginal annular portions 8a, second annular portions 8b of an intermediate size, and third annular portions 8c having largest longitudinal dimensions.

Another feature of the invention is that the annular portions or assembly elements 8 have modular length dimensions measured parallel to the longitudinal direction of the embossing roller 2.

Accordingly, the length of the annular portions 8 is a multiple of a predetermined fraction of the length of the cylindrical surface. 4.

In the schematically shown example, it may be seen that, taking the length of the first marginal annular portions 8a as the standard, the second annular portions 8b are twice as long, and the third annular portions 8c are three times as long.

The releasable engagement means 9, 10 between the supporting core 6 and the annular portions 8 comprise discrete rotation-preventing elements 9 and translation-preventing elements 10. In addition, the rotation-preventing elements 9 also form angular positioning members for the annular portions or assembly elements 8.

In detail, the rotation-preventing elements 9 comprise a longitudinal cutout 11 formed through the section of the core 6 which engages with the shroud 7, and correspondingly mating cutouts 12

formed in the annular portions 8. Illustratively, the longitudinal cutout 11 is substantially round in cross-section and so are the mating cutouts 12.

Tab elements 13 are set astride between the longitudinal cutout 11 and the mating cutouts 12, as shown in Figure 7. In the example shown (Figure 4), the mating cutouts 12 have limited length and are aligned on opposite sides from the annular portions 8. In that case, the tab elements 13 have limited length , do not slide along the longitudinal cutout 11, and are immediately positionable.

The translation-preventing elements 10 comprise a first fixed shoulder 14 located on one end of the shroud 7, and a second shoulder 15 which locates on the other end of the shroud 7 and is threadable over the supporting core 6 to clamp the annular portions 8 tight. The diameters of the shoulders 14 and 15 are slightly smaller than the diameters of the annular portions 8.

The annular portions or assembly elements 8 have, as may be evinced from the foregoing discussion, a symmetrical structure about perpendicular mid-planes to the axis of rotation of the embossing roller 2, thereby they may be indifferently slipped over the core 6 at positions tilted through 180° from each other. In practice, it is impossible to change the side of the annular portions 8 facing the first fixed shoulder 14.

Figure 8 shows that the assembly elements or annular portions 8 have marginal regions 16 with interconnection surface corrugations, that is showing ornamental patterns which are effective to both separate and interconnect the surface corrugations of any directly adjacent assembly elements 8.

Lastly, we wish to point out that the drawing figures show an embossing roller 2 provided at one end with a drive flange 17, integral with a sleeve 18 which is mounted to and made unitary with one end 20 of the supporting core 6, and bearing portions 21 providing pivotal support for the core 6.

The device operates as follows.

By just slipping the annular portions 8 over the supporting core 6, followed by threading on the second shoulder 15, any shroud 7 may be composed.

In particular, an embossing roller 1 may be set up which has a cylindrical surface 4 with ornamental patterns which are neatly divided into different regions, and with the most appropriate combinations and positions of the various regions, occasionally even in accordance with the products to be made. As an example, if clothing elements or accessories are sought which have a composite appearance, wherein different patterns or materials appear to be combined together, the most appropriate combinations are selected as relates to pattern or material imitation, and then the annular portions or assembly elements 8 are positioned each time according to the size of the products to be made. Illustratively, Figure 3 shows a handbag having a composite appearance, which is provided centrally with the pattern from the third annular portions 8c, whilst marginal regions are patterned according to the second annular portions 8b.

In these articles, the width of the central region may vary considerably, and it may be best, therefore, to change the width of its respective pattern, such as by inserting on the shroud 7 individual third annular portions 8c, between the second annular portions 8b, or side-by-side pairs of third annular portions 8c, also between the second annular portions 8b. In the latter instance, the width of the pattern of the third annular portions 8c would be doubled.

The modular lengths of the annular portions 8 make any compositions of the shroud 7 simple and easy.

It should be noted that among the very many variations made easy by the invention, there also is that of customizing the stripe 5:to suit the user or the stylist for whom the material is intended, the edges may take specific markings, by exchanging the first annular portions 8a.

For the possibilities opened by the invention to be understood, it may be considered that once a given number of annular portions or assembly elements 8 have been made available to varying patterns, an enormous number of shrouds 7 can be made up with different cylindrical surfaces.

Combinatory figuring out confirm that such is the situation even when only some of all the rollers feasible are considered: e.g. those having their shrouds symmetrical about a transverse mid-plane and at all times only three different annular portions 8 at each half-length of the shroud.

If one has thirty different types of assembly elements or annular portions 8 available, and two specimen per type, which are on the whole the equivalent of just ten embossing rollers of the traditional type, the invention allows formation of over twentyfour thousand different shrouds.

The computation is made taking into account all the different shrouds by the type or position of the annular elements, on the basis of the known formula for dispositions: $D_{n,k} = n!/(n-k)!$, where $n = 30$ and $k = 3$.

If one has sixty different types of the annular portions 8 available (and two specimen for each type and again under the above conditions: symmetrical shrouds and half-lengths of the shrouds formed of three different annular portions), being on the whole the equivalent of just twenty traditional-type rollers), it becomes possible to form, through the invention, more than twohundred thousand different shrouds.

The figures go still much higher if said limitative conditions are abandoned.

A further increase in possibilities is achieved where it is considered that each annular portion 8 may be worth two if turned over.

In fact, turning over through 180° may result in very particular aesthetic effects. Let the annular portions carrying diagonal lines be considered for example: several annular portions laid side-by-side and in the same manner provide broad diagonal lines, whereas by alternating straight portions with turned-over portions one obtains a zig-zag or Greek fret motif.

Claims

1. A device for impressing raised patterns on sheet materials, comprising an embossing roller (2) and an auxiliary roller (3) lying adjacent for rotation about respective parallel axes (2a,3a) of rotation, said embossing roller (2) presenting a cylindrical surface (4) having surface corrugations adapted to impress raised patterns on said sheet material (5), characterized in that said embossing roller (2) comprises a plurality of consecutive assembly elements (8) defining outwardly annular bands of said cylindrical surface (4) formed with said surface corrugations and being aligned to one another along a longitudinal direction parallel to said axes (2a,3a) of rotation, and that said embossing roller (2) comprises means (9,10) for releasably engaging said assembly elements (8) effective to enable location of each said assembly elements (8) at a selected location along said longitudinal direction.

2. A device according to Claim 1, wherein said embossing roller (2) has a core (6) and a shroud (7) extending on said core (6) and defining outwardly said cylindrical surface (4), said assembly elements (8) being defined by annular portions of said shroud (7) adapted to be assembled together in mutually aligned positions and being engaged by said core (6) through said releasable engagement means (9,10).

3. A device according to Claim 2, wherein each said assembly elements (8) has a symmetrical structure about a perpendicular mid-plane to said longitudinal direction, said symmetrical structure being adapted for engagement by said core (6) in positions turned over through 180°.

4. A device according to Claim 2, wherein each said assembly elements (8) have a modular length, as measured parallel to said longitudinal direction, said modular length being a multiple of a predetermined fraction of the length of said cylindrical surface (4).

5. A device according to Claim 2, wherein said releasable engagement means (9,10) between said core (6) and said assembly elements (8) comprise translation-preventing elements (10) and rotation-preventing elements (9) distinguished from each other, and wherein said rotation-preventing elements (9) are also angular positioning members for said assembly elements (8).

6. A device according to Claim 5, wherein said rotation-preventing elements (9) comprise a longitudinal cutout (11) on said core (6) and correspondingly mating cutouts (12) on said assembly elements (8), tab elements (13) being insertable between said longitudinal cutout (11) and mating cutouts (12).

7. A device according to Claim 5, wherein said translation-preventing elements (10) between said core (6) and said assembly elements (8) comprise shoulders (14,15) engageable at least in part by threading over said core (6) and located at ends of said shroud (7).

8. A device according to Claim 2, wherein marginal regions (16) of said assembly elements (8) have surface corrugations for separation from and connection to surface corrugations of directly adjacent assembly elements (8).

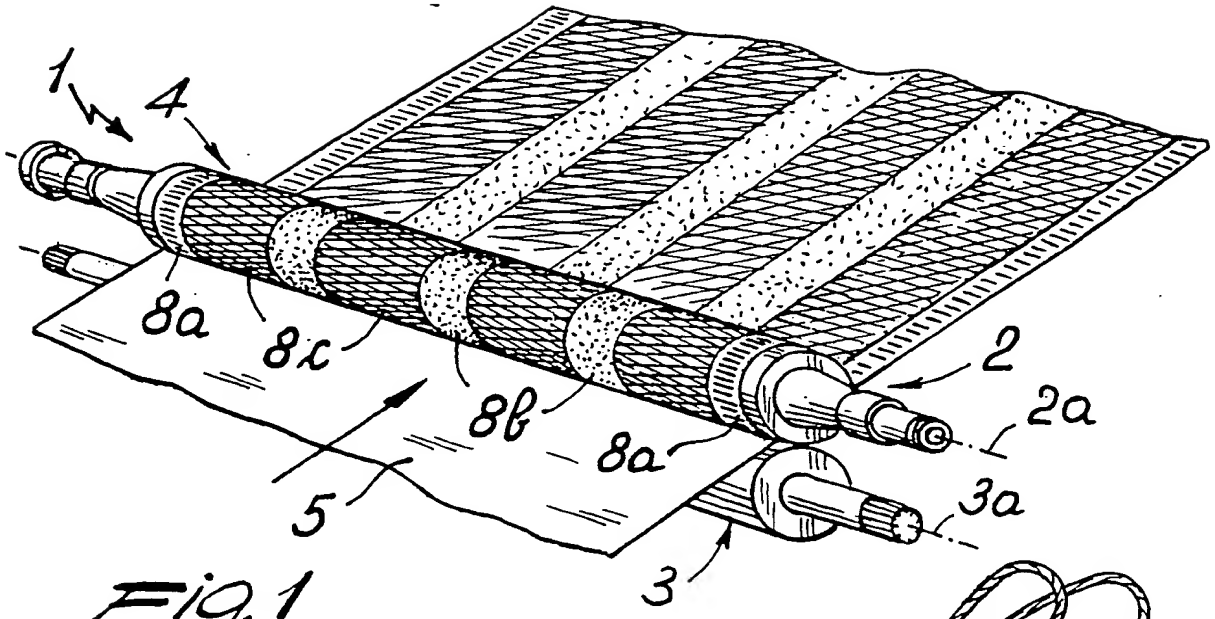


Fig. 1

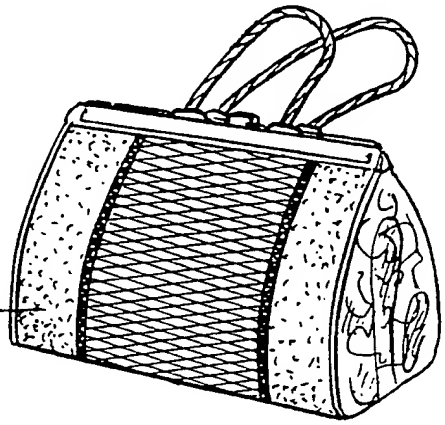
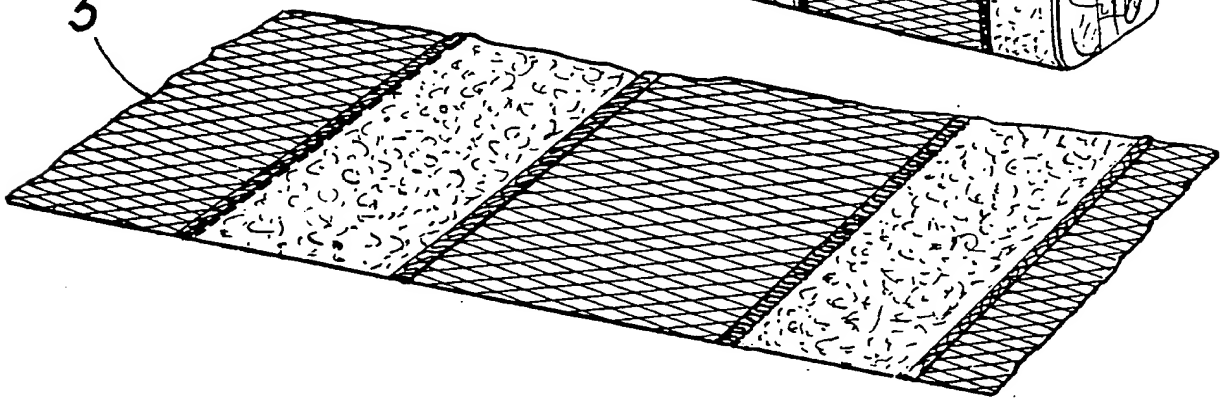


Fig. 3

Fig. 2



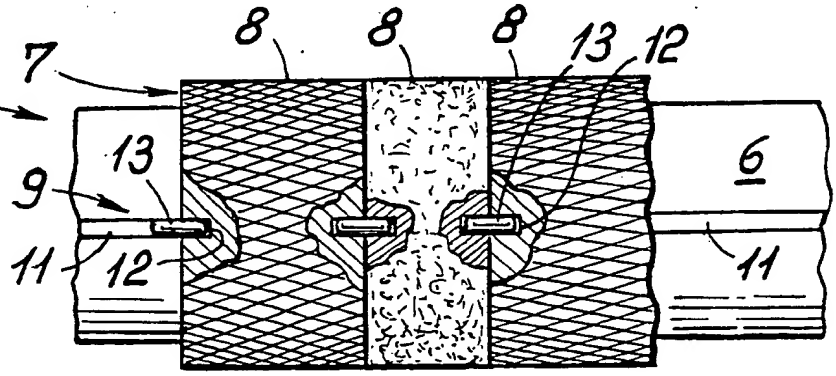


Fig. 4

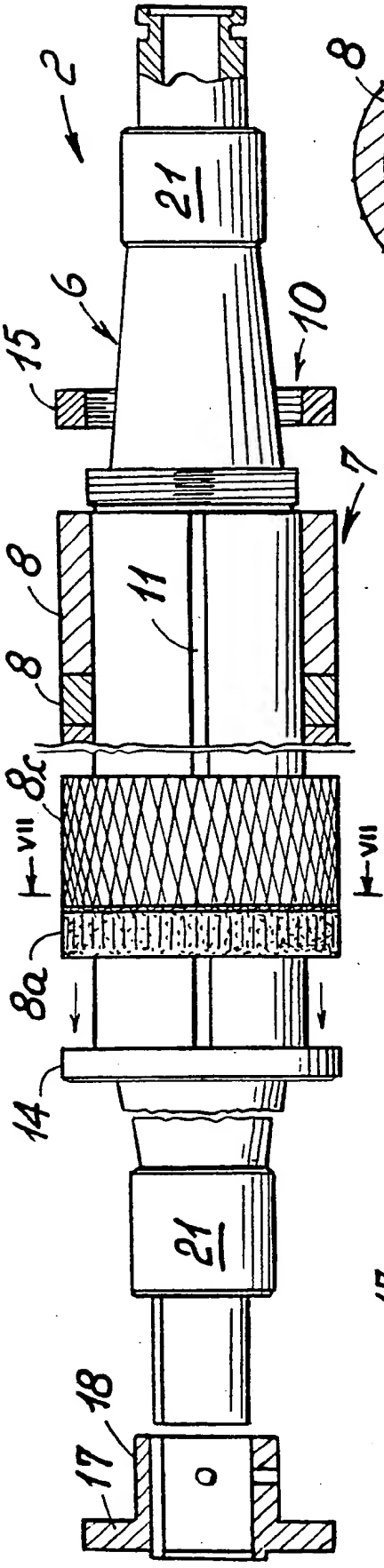


Fig. 5

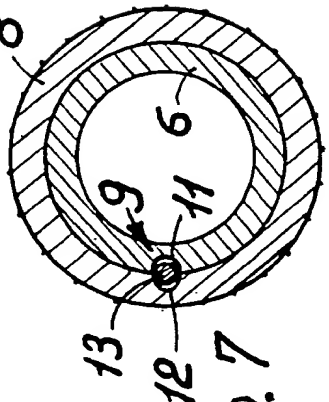


Fig. 7

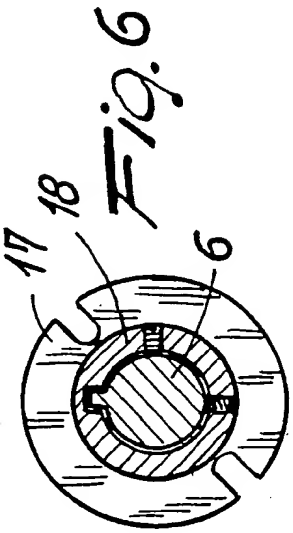


Fig. 6

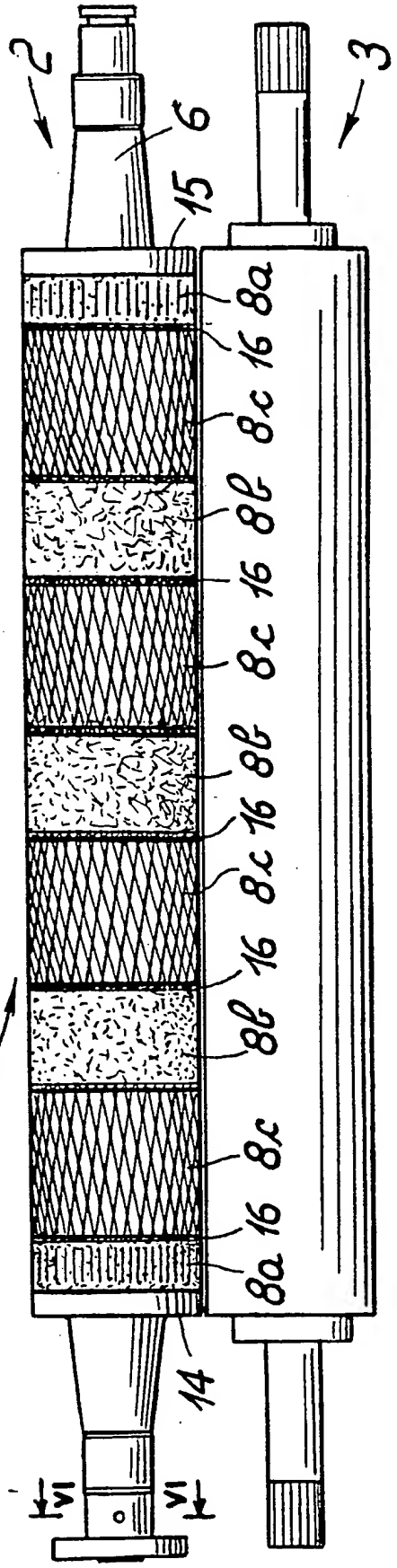


Fig. 8

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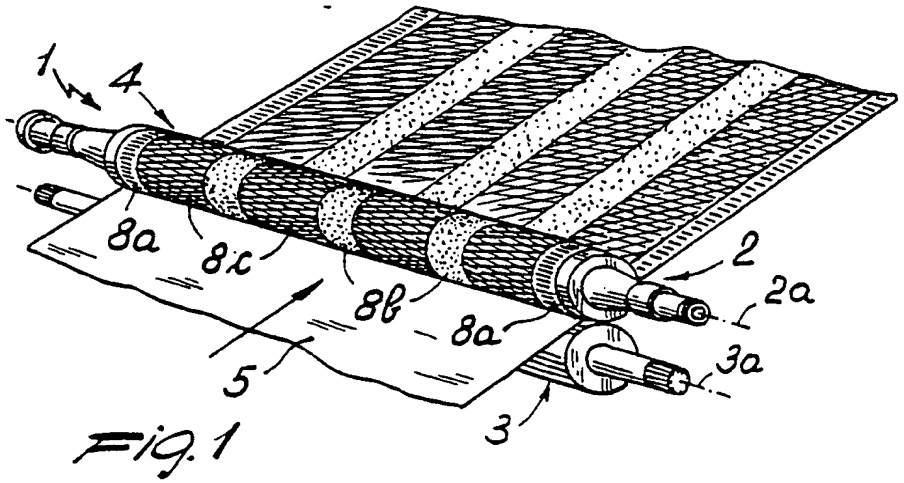

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number

EP 89 11 8700

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 401 077 (ZINK) * Column 2, lines 18-37; fig. *	1-8	B 31 F 1/07
X	US-A-1 954 635 (LEONARD) * Whole document *	1-8	
X	US-A-3 717 532 (KAMP) * Column 5, lines 8-37; fig. *	1-8	
X	DE-C-1 870 60 (KREPPFABRIK) * Claims; fig. *	1-8	
A	US-A-1 946 838 (COFRIN)		
A	FR-E-2 335 1 (THIEBAUT)		
A	FR-A-1 595 058 (SUD-AVIATION)		
A	US-A-1 719 947 (SWIFT)		
A	DE-B-1 043 059 (SCHICKEDANZ)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 31 F

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	06 November 90	PEETERS S.

CATEGORY OF CITED DOCUMENTS

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